

New Species of the Genus *Baetodes*

(Ephemeroptera: Baetidae)

VELMA KNOX MAYO

2702 E. Seneca St., Tucson, Arizona 85716

The genus *Baetodes* is known at the present time from Arizona and Texas in the United States, and from Mexico, Central and South America. In Central America it has been taken from Guatemala, Honduras, Costa Rica, El Salvador, Panama and the Canal Zone. In South America it has been collected in Brazil, Venezuela, Ecuador, Peru, and Bolivia.

The genus was established in 1924 by Needham and Murphy. A review of the characteristics of the genus by Needham and Murphy (1924), by Traver (1943, 1944) and by Edmunds (1950) was included in a paper by the writer (Mayo, 1968). Traver (1943) described the only known adult, *Baetodes spiniferum*. She requested that the writer emend the spelling on her *B. spiniferum* to *Baetodes spinifer*. Cohen and Allen (1972) have described nine new species of *Baetodes* from Mexico and Central America.

GENERIC DIAGNOSIS

NYMPHS.—*Head* (Fig. 16, Mayo, 1968). Ocelli prominent, two large ones laterad of epicranial fork, and small one, below these within fork. Mouthparts as follows: *Labrum* with sclerotized band along lateral margins and thick fringe of setae around margin, apical margin with cleft at midline, row of stout, prominent spines of varying length and number and arranged in two groups (one near midline, and one closer to lateral margin). Behind apical margin with numerous scattered, shorter setae behind these (Figs. 5, 8). *Mandibles* with thumblike process at base of molar surface of left mandible that varies in size and shape in different species, rim of molar surface near the thumb with one tooth larger than others (Fig. 24), lacinia well developed on left mandible, situated close to incisors (Fig. 17), lacinia on right mandible represented by small, slender, pointed process situated half way between molar surface and incisors. Highly sclerotized "anterior articulatory process" (Traver and Edmunds, 1968) extends parallel and posterior to molar surfaces on both mandibles; right mandible with short bristle extending from rim of molar surface (Fig. 4). *Maxillae* with palpi two segmented (Fig. 22), and crowns of maxillae with fringe of long, stout setae (Fig. 16). *Labium* with palpi three segmented (Figs. 12, 15), apical segment of labium with spines (Figs. 12, 15), paraglossae with thick brush of curved pectinate spines of varying lengths and curving mesally with all pinnae directed mesally (Fig. 2), glossae with setae at tips (Fig. 12). *Thorax* with anterior border of pronotum concave and anterolateral corners acute (Fig. 9), hind wings absent, narrow, elongated cervical sclerite articulates with posterior border of propleuron, and extends to head on

either side, high dorsal crest on each coxa, legs unusually long and slender, tibiae slightly longer than femora and tarsi slightly less than $\frac{1}{3}$ as long as tibiae, femora with variable number of stiff spines along dorsal crests, tibiae distinctly marked with narrow strip which extends over $\frac{2}{3}$ of dorsal surface and terminates at ventral margin, shaft of tibia beyond this point abruptly more narrow and narrow point of segment marked with diagonal streak (Fig. 14), fringe of setae along dorsal crests of femora and tibiae, femoral and tibial articulations heavily sclerotized, claws each with long, stout, colorless bristle originating near base of first marginal denticle and curving out as far as the tip of claw (Figs. 3, 6), variable number of denticles, decreasing in size rearward. *Abdomen* with simple gills on abdominal terga 1-5 only, gills attach near low pleural fold. *Caudal filaments* without setae, terminal filament short stub and correspondingly narrower than lateral cerci.

DISCUSSION

The spines behind the apical margin of the labrum are prominent, varying in length, and are often alternated, one long, one short (Fig. 5). According to Traver and Edmunds (1968), Macan (1961) "shows how the pattern of spines on the dorsal surface of the labrum serves to differentiate four different species of *Baetis*." The spines behind the apical margins of the labra of *Baetodes* described in this paper are distinctive for each species except for *B. obesus* (Fig. 32) and for *B. sanctitarinae* (Fig. 45). Those of *B. sanctitarinae* are much farther from the apical margin than those of *B. obesus*.

In some species a hump or tubercle occurs on the posterior border of the pronotum.

The spines along the dorsal crests of femora of most species are prominent but are difficult to detect on *B. obesus*. On one species examined they were invisible under the binocular microscope, but three yellow spines were visible under high power of the compound microscope.

Discussion of the long bristle behind the claw was omitted from the descriptions of *B. spinae* and *B. levis* and from Fig. 19 (Mayo, 1968).

There are no tubercles on the abdomen of the species herein described. Abdominal tubercles occur on the majority of species and where there are tubercles on the abdomen there is usually one on the metanotum. These tubercles are always unpaired, arising from the posterior border at the midline. Some are very small, directed rearward and some are erect and prominent.

On many species elongated fingerlike gills occur at the bases of all three pair of coxae. Some of these are single, and some are paired. There are three different sizes, long, intermediate, and small. The largest, and by far the most common, are four times the length of the smallest size.

Many species have scattered setae on the dorsal surface of the body segments.

Baetodes chilloni Mayo, new species

(Figs. 1-5)

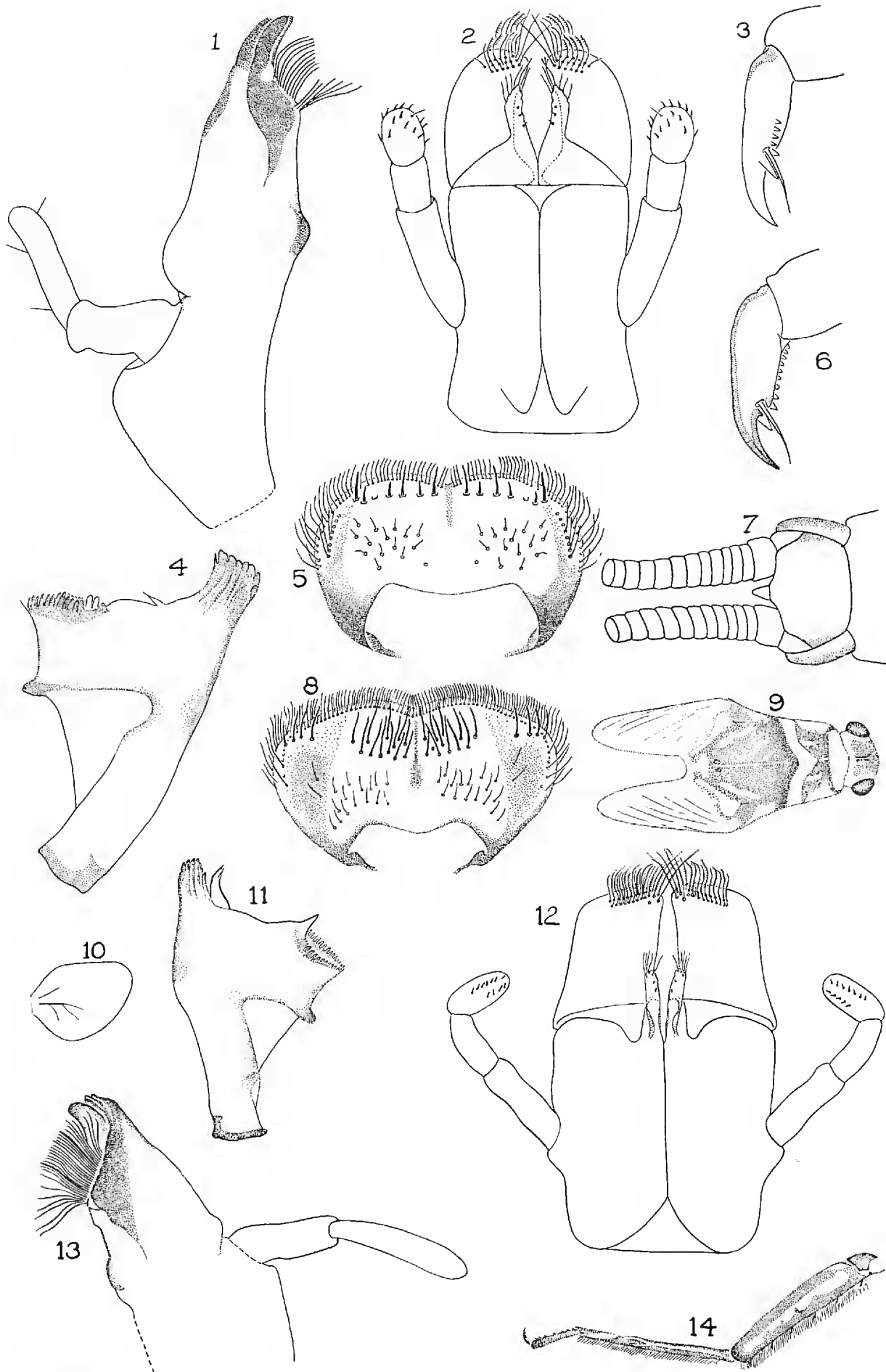
FEMALE NYMPH.—Length of body about 4 mm, cerci slightly shorter. General color brown dorsally. *Head* brown; darker brown spots on either side midline between eyes; eyes bordered with yellow; antennae pale yellow. Mouthparts as in Figs. 1, 2, 4, 5. All intersegmental membranes pale yellow. *Thorax* with pronotum brown; anterior border narrowly rimmed with dark brown; mesonotum and wing pads brown; numerous fine white setae dorsally on thorax; pleural sclerites brown; unsclerotized areas pale yellow. Coxae and trochanters brown; femora an even brown except for a large pale yellow spot near joining with trochanters; rimmed with dark brown at joinings with tibiae; six or seven reddish brown spines on dorsal crests of femora. Tibiae pale brown with usual white streak entire length. Tarsi light brown; reddish brown at joining with claw. Claw as in Fig. 3. Sternum pale yellow except for brown, curved sclerites at apodemes. *Abdomen* with all terga an even brown, anterior borders narrowly rimmed with dark brown; without tubercles. Abdominal gills light yellow, darker on basal half, each coxa with two fingerlike gills of long type. Sternum 1 pale brown, lighter mesally; 2-9 brown, 6-9 with pale yellow horizontal streak laterally near anterior borders; 8-10 with triangular yellow area with base along entire posterior borders and apex at midline on anterior borders; pleural fold yellow. Cerci and terminal filament yellow tinged with brown distally.

Holotype female nymph, STATION V, RIO CHILLON, PERU, 500 m, 3 May 1958, J. Illies. In Entomological collection University of Utah, Salt Lake City. Paratype: 1 nymph, same data, same deposition as holotype.

DISCUSSION.—General color of thoracic sternum pale yellow; that of abdominal sternum brown as on dorsal surface. *Baetodes chilloni* can be distinguished from *B. solus* by the presence of coxal gills. The thoracic sternum of this species is pale, whereas that of *B. solus* is dark brown. The labrum differs in details of the spines behind apical margin from those of *B. solus* (Fig. 5, 18). Details of the mouthparts of this species distinguish it from *B. sp. No. 1* (Figs. 7, 8, 10, 20, 24, Mayo, 1968).

→

FIG. 1. Maxilla of *B. chilloni*. FIG. 2. Labium of *B. chilloni*. FIG. 3. Claw of *B. chilloni*. FIG. 4. Right mandible of *B. chilloni*. FIG. 5. Labrum of *B. chilloni*. FIG. 6. Claw of *B. traversae*. FIG. 7. Cerci and terminal filament of *B. traversae*. FIG. 8. Labrum of *B. traversae*. FIG. 9. Dorsal view of head and thorax of *B. traversae*. FIG. 10. Gill IV of *B. traversae*. FIG. 11. Left mandible of *B. traversae*. FIG. 12. Labium of *B. traversae*. FIG. 13. Maxilla of *B. traversae*. FIG. 14. Leg II of *B. traversae*.



Baetodes traveræ Mayo, new species

(Figs. 6-14)

FEMALE NYMPH.—Length of body about 6 mm, cerci about 7 mm. General color dark brown; unsclerotized areas yellow. Head more narrow than that of other species; area between eyes dark brown; yellow anterior to eyes and around bases of antennae; first two segments of antennae yellow, remaining segments pale brown; mouthparts as in Figs. 8, 11-13. Spines behind apical margin of labrum grouped together (Fig. 8); glossae short (Fig. 12) thumb on left mandible pointed (Fig. 11). Two long bladelike spines among setae on crowns of maxillae. Large ocelli with black crescent on inner margins; small one rimmed with black on anterior margin. *Thorax* with pronotum dark brown along anterior border; irregular yellow areas as in Fig. 9; anterior margin concave; posterior margin convex so that medial portion of pronotum less than half as deep as lateral borders. Mesonotum brown along anterior border; and on either side of midline to scutellum. Two diagonal, wide yellow areas on scutum at border of wing pads; two dark brown dots close to midline anterior to scutum (Fig. 9) and laterally, half way between anterior border and wing pads. Metanotum dark brown. Posterior border yellow lateral to midline. Thoracic sclerites of pleuron dark brown; unsclerotized areas pale yellow; femora with wide pale yellow stripe on dorsal surface; dark brown at joinings with tibiae; tibiae brown (Fig. 14); tarsi brown with seven spines along lower edge; blackish brown at joining with claw; claw with ten denticles (Fig. 6). Sternum pale yellow except for small brown sclerites around apodemes at postero-lateral corners of meso- and metasternum. *Abdomen* with terga darker brown than thorax; midline with very faint yellow streak on all terga; more prominent on 10; shaded with yellow at pleural fold; posterior borders of terga 3-6 yellow to midline. Without abdominal tubercles; abdominal gills oval, tracheae white (Fig. 10). Sterna very pale brown; narrow brown markings horizontally on 2-9 on either side of midline close to anterior border; vertical brown streaks $\frac{2}{3}$ distance between anterior and posterior borders near pleural fold on segments 2-9. Cerci light brown; terminal filament unusually short stub; not as long as depth of first segment of cerci; at base about $\frac{1}{3}$ width of base of cerci; appears to be unsegmented; better seen from ventral aspect (Fig. 7).

MALE NYMPH.—Length of body about 5 mm, cerci 5 mm.

Holotype female nymph, STATION II RIO CHILLON, PERU, 2500 m, 3 May 1958, J. Illies. In Entomological collection University of Utah, Salt Lake City. Paratypes five nymphs same data, same deposition as holotype. Twelve nymphs, station III Rio Chillon, Peru, 1900 m, 3 May 1958, J. Illies. Same deposition as holotype.

DISCUSSION.—*Baetodes traveræ* can be distinguished from all other species by the terminal filament which is so small as to be hard to see from the dorsal view (Fig. 7, ventral view). The glossae are much shorter than those of any other species examined (Fig. 12); the thumb on left mandible is more pointed (Fig. 11); the spines behind apical margin of labrum are grouped together as on no other species (Fig. 8). Thoracic sterna of mature specimens are developed as in subimago.

This species is named in honor of Dr. Jay R. Traver, emeritus professor of Zoology, University of Massachusetts, Amherst, Massachusetts.

Baetodes solus Mayo, new species

(Figs. 15-19)

FEMALE NYMPH.—Length of body about 3 mm, cerci somewhat longer. General color yellowish brown. *Head* pale brown patches either side midline between eyes; light brown in epicranial fork; first two segments antennae pale, rest pale smoky brown. Mouthparts as in Figs. 15-18. One wide bladeliike spine distally near inner margin of each paraglossa (Fig. 15). Two long bladeliike spines among setae on crowns of maxillae. *Thorax* with nota of all segments light brown mottled with yellow. Pleural sclerites brown. Femora light brown except for yellow area near distal end; narrowly rimmed with reddish brown at joinings with tibiae; tibiae pale brown. Tarsi pale brown, darker at joinings with claw. Sternum dark brown mottled with fine yellow dots. *Abdomen* with terga pale brown, darker along anterior borders; without tubercles. Abdominal gills as in Fig. 19. Without coxal gills. Sternum 1 dark brown and mottled as on thorax; 2-9 brown, somewhat lighter than thoracic sternum; 10 light brown. Cerci and terminal filament pale, smoky tinged.

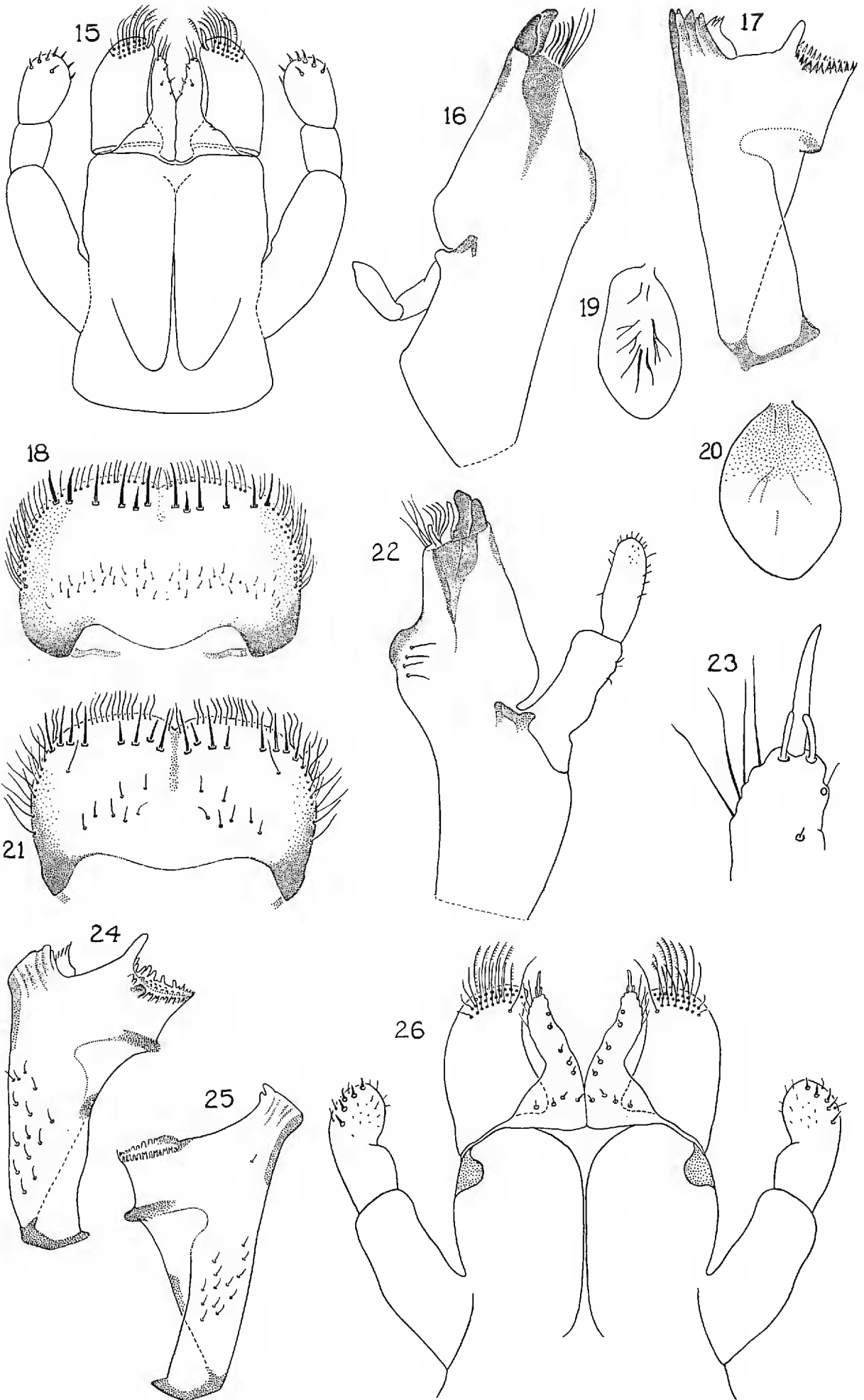
Holotype female nymph, RIO BELLA AT JCT. OF RIO MONZON, MONZON VALLEY, HUANUCO PROVINCE, PERU, 25 July 1963, W. L. Peters. In Entomological collection University of Utah, Salt Lake City.

DISCUSSION.—*Baetodes solus* has no abdominal tubercles or coxal gills. See discussions of *B. obesus*, *B. bellus*, and *B. traverae* for distinguishing characters between these species and *B. solus*. *B. solus* can be separated from *B. sp. No. 1* by the details of the mouthparts, particularly those of the labrum (Figs. 7, 8, 10, 20, 24, Mayo, 1968).

Baetodes andamagensis Mayo, new species

(Figs. 20-26)

MALE NYMPH.—Length of body 4.5 mm; cerci longer. *Head* with brown on either side midline between turbinate eyes; brown in fork; pale spot over small ocellus. Antennae very pale brown. Mouthparts as in Figs. 21-26. Each paraglossa with long seta, not pinnate, directed mesally with base below bases of pinnate spines. Tip of each glossa with two short blunt spines at base of one long bladeliike spine (Fig. 23). Mandibles with two small lobes of incisors at inner margin; other incisors compacted into single lobe as in Figs. 24, 25; delicate setae scattered on surfaces as in Figs. 24, 25. Labrum (Fig. 21) with long sclerotized strip behind cleft. Maxillae with two wide bladeliike spines with blunt tips among setae on crown (Fig. 22). *Thorax* with pronotum dark brown with pale yellow area at midline along posterior border. Posterior rims of pleural sclerites visible on either side of pronotum from dorsal view. Intersegmental membrane between pro- and mesonota pale yellow. Mesonotum dark brown; dark reddish brown streaks parallel to midline half way between midline and borders of wing pads; mottled with reddish brown at bases of wing pads; scutellum pale; wing



pads brown; pleural sclerites, coxae and trochanters brown; femora brown, same color as thoracic notum; pale yellow spot near joining with trochanter, rimmed with reddish brown at joining with tibiae; fringe of white setae on tarsi; tibiae and tarsi very pale brown; tibiae narrowly rimmed with reddish brown at joining with femora. Sterna pale yellow, except for brown curved strip on prosternum between apodemes, and dark brown apodemes at leg bases on meso- and metasternum. *Abdomen* with terga dark brown. Intersegmental membranes yellow. Tergum light brown anteriorly, dark brown posteriorly along posterior border. Dark streak on either side midline on terga 2-8, indistinct on 2-5; terga 5-7 darker, 9 an even brown, 10 pale brown. All terga narrowly rimmed with reddish brown along anterior borders. Without tubercles. Abdominal gills oval, smoky in basal half (Fig. 20). Two fingerlike gills from each coxa of the intermediate type. Numerous white setae clustered along midline. Sternum 1 pale yellow; 2-6 brown from anterior to posterior borders on medial third of segments, laterally yellow, each lateral area medially with narrow brown streak extending from anterior border half way to posterior border; 7-9 darker brown, lateral yellow areas mere streaks, streaked with dark brown along pleural fold; 9 yellow along posterior border; 10 yellow. Cerci and terminal filament very pale brown.

FEMALE.—Head more pale; tibiae and tarsi very pale; cerci and terminal filament pale yellow.

Holotype male nymph, ANDAMAGO RIVER NEAR ONGORO, PERU, 16 May 1958, J. Illies. In Entomological collection of University of Utah, Salt Lake City. Six paratypes, same data, same deposition as holotype. Two paratypes, irrigation canal near hacienda, Ongoro, Peru, 16 May 1958. J. Illies. Same deposition as holotype.

DISCUSSION.—On the mandibles there are two small lobes on the incisors at the inner margin. The rest are compacted into a single lobe as in Figs. 24, 25. This is unique. The labrum can be distinguished from all others by the spines behind the apical margin (Fig. 21). Maxillae have two wide bladelike spines with blunt tips among setae on crown (Fig. 22).

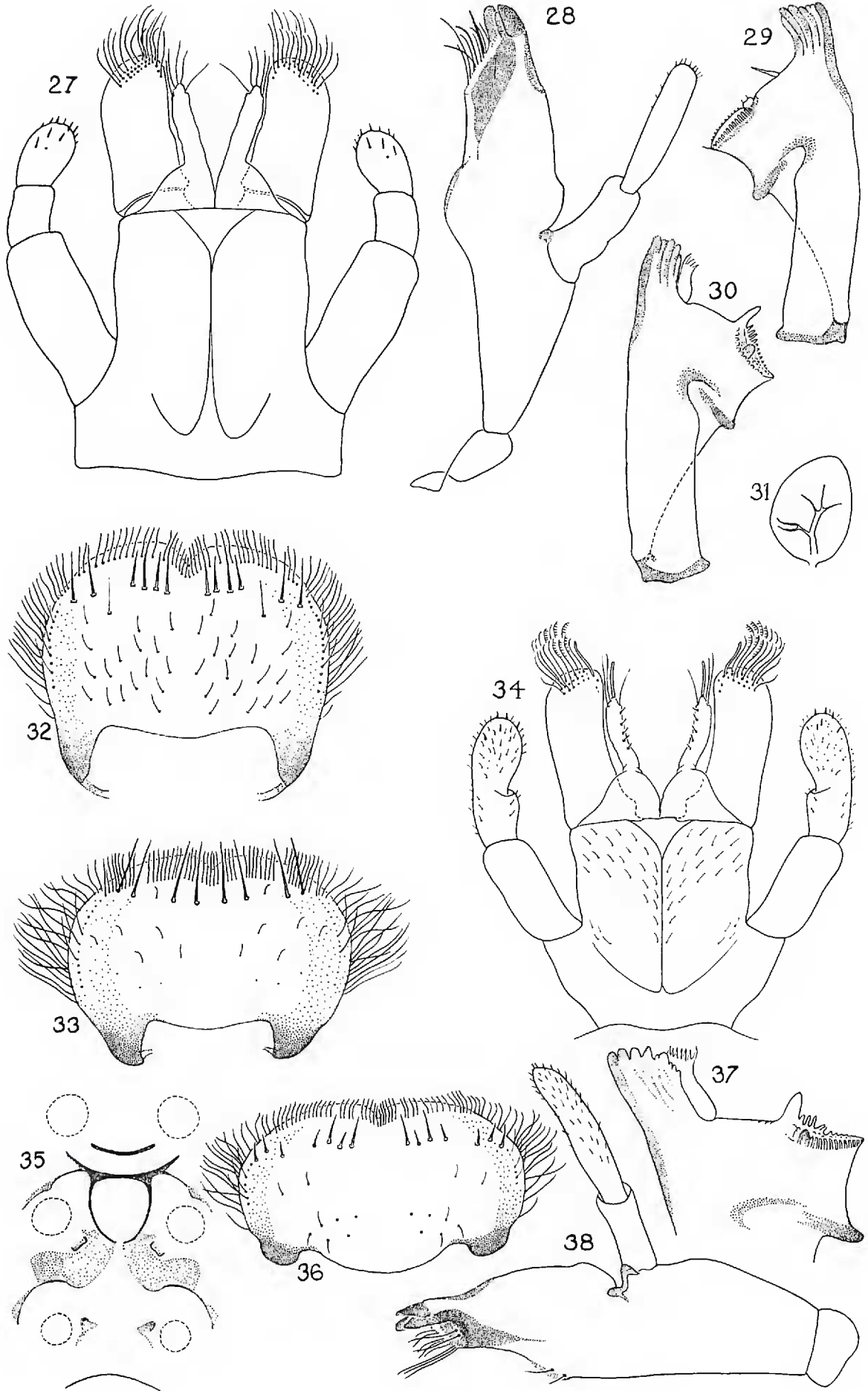
Baetodes obesus Mayo, new species

(Figs. 27-32)

FEMALE NYMPH.—Length of body 3 mm, cerci about 4 mm. Stout species. *Head* widely yellow around eyes; laterally tips of large ocelli very close to eyes; light brown either side midline between ocelli, in fork and on genae; pale yellow anterior

←

FIG. 15. Labium of *B. solus*. FIG. 16. Maxilla of *B. solus*. FIG. 17. Left mandible of *B. solus*. FIG. 18. Labrum of *B. solus*. FIG. 19. Gill of *B. solus*. FIG. 20. Gill III of *B. andamagensis*. FIG. 21. Labrum of *B. andamagensis*. FIG. 22. Maxilla of *B. andamagensis*. FIG. 23. Tip of glossa of *B. andamagensis*. FIG. 24. Left mandible of *B. andamagensis*. FIG. 25. Right mandible of *B. andamagensis*. FIG. 26. Labium of *B. andamagensis*.



to small ocellus; anterior margin very narrowly rimmed with dark brown between antennae and around bases of antennae; antennae yellow, tinged with pale brown near tips. Clypeus pale, labrum light brown. Mouthparts as in Figs. 27-30, 32. Labrum not sclerotized below medial cleft. Two long bladeliike spines among setae on crown of maxillae; very faintly pinnate. Intersegmental membrane between head and pronotum white, penciled with gray medially; gray area extends from anterior to posterior borders half way from midline to lateral border. *Thorax* with anterior border of pronotum evenly bordered with brown except at midline which is pale; pronotum yellow with pale area along midline and posterior border near midline; two yellowish brown stripes from anterior brown border to pale area along posterior border, about half way between midline and lateral borders; two brown oval spots on either side near posterior border; narrow reddish brown rims of pleural sclerites show on either side of pronotum. Mesonotum yellow except for brown anterior border, light brown side stripe on either side pale midline tapering to half width anterior to scutellum; mottled with light brown laterally with two darker brown oval spots, one either side midline anterior to scutellum, and several near borders of wing pads yellow, with three brown oval spots, one mesally and two anteriorly; scutellum and borders of wing pads pale; reddish brown streak on scutum anteriorly along border of wing pads; brown area either side of scutellum. Metanotum dark brown. Legs pale yellow; pleural sclerites light brown. Cervical sclerites reddish brown. Coxae and trochanters light brown. Femora yellow, darker in medial third; spines on dorsal crests inconspicuous. Tibiae rimmed with reddish brown at joinings with femora, otherwise pale; several spines on ventral surface. Tarsi yellow, washed with reddish brown in distal third at joining with claw; narrowly rimmed with reddish brown at joining with tibiae; six to eight fairly long spines along ventral surface of tarsi. Claw with five denticles. Sternum pale yellow. *Abdomen* with tergum 1 dark brown; 2 dark brown except for yellow area mesally on posterior margin and on either side midline $\frac{2}{3}$ way to anterior border; tergum 3 the same except brown area more pale and yellow area larger; terga 4-6 yellow, 7-8 light brown, 9-10 yellow; intersegmental areas pale yellow. Without tubercles. Abdominal gills oval, white (Fig. 31). Two elongated fingerlike gills from each coxa of the long type. Sterna 1-6 pale yellow tinged with brown along anterior margin, 7-8 amber tinged with brown anterolaterally, 9 yellow with brown anterolaterally, 10 yellow. Cerci yellow, stout at bases; terminal filament yellow, much thinner.

Holotype female nymph, TENNDIDO RIVER, 3 KM N. EL FORTIN, VERA CRUZ, MEXICO, 1 July 1955, R. B. and J. M. Selander. In Entomo-

←

FIG. 27. Labium of *B. obesus*. FIG. 28. Maxilla of *B. obesus*. FIG. 29. Right mandible of *B. obesus*. FIG. 30. Left mandible of *B. obesus*. FIG. 31. Gill of *B. obesus*. FIG. 31. Gill of *B. obesus*. FIG. 32. Labrum of *B. obesus*. FIG. 33. Labrum of *B. bellus*. FIG. 34. Labium of *B. fortinensis*. FIG. 35. Thoracic sternum of *B. fortinensis*. Leg bases indicated by dotted circles. FIG. 36. Labrum of *B. fortinensis*. FIG. 37. Left mandible of *B. fortinensis*. FIG. 38. Maxilla of *B. fortinensis*.

logical collection University of Utah, Salt Lake City. Paratype, 1 female nymph, same data, same deposition as holotype.

DISCUSSION.—*Baetodes obesus* can be distinguished from *B. solus*, *B. traversae*, and *B. bellus* by the coxal gills. The spines on dorsal crests of femora are fine, inconspicuous, in contrast to the prominent spines of the other species in this group. The labrum can be distinguished from that of all other species in this group by the spines behind the apical margin (Figs. 5, 8, 18, 32, 33, 36, 39). The two bladeliike spines among setae on crowns of maxillae are faintly pinnate. This is not the case among the other species in this group.

***Baetodes bellus* Mayo, new species**

(Fig. 33)

MALE NYMPH.—Length of body 4 mm, cerci about 5 mm. *Head* light reddish brown on vertex, between turbinate eyes, along midline and epicranial suture; widely rimmed with yellow around turbinate eyes; pale between large ocelli and eyes; brown in fork and between antennae; pale around small ocellus; very narrowly rimmed with reddish brown between and around bases of antennae; antennae pale yellowish brown, darker distally; intersegmental membranes pale; clypeus and labrum pale. Labrum slightly sclerotized below medial cleft (Fig. 33). Each glossa with pointed bladeliike spine at tip. Two long, bladeliike spines among setae on crowns of maxillae. Intersegmental membrane between head and pronotum white, penciled with gray across medial third. *Thorax* with pronotum yellow, narrowly bordered with light brown along anterior margin; three pale brown areas on either side midline; dark reddish brown margin of pleural sclerites shows on either side pronotum. Intersegmental membrane between pro- and mesonota white bordered with dark gray posteriorly. Anterior border mesonotum penciled with dark brown along fairly wide strip; mesonotum yellow faintly mottled with light brown; midline pale with brown stripes along either side terminating in two brown spots anterior to scutellum; another stripe lateral to each stripe; mottled with brown at wing bases. Metanotum yellow mottled with brown, darker brown along pale midline. Pleural sclerites light brown. Coxae and trochanters light brown; femora light brown with pale yellow spot near joining with trochanters; pale elongated spot below this in medial third, pale spot distally; brown at joinings with tibiae; tibiae rimmed with reddish brown at joinings with femora; remainder of segment light brown; few minute spines along ventral surface. Tarsi yellow in apical half and reddish brown at joinings with claws; darker dorsally; about six minute spines along ventral surface of tarsi. Claws with five denticles. Pro- and mesosterna pale yellow; metasternum slightly darker. *Abdomen* dark brown and yellow; tergum 1 dark brown on anterior two thirds, yellow along posterior border; terga 2-3 yellow laterally and along posterior borders at midline; remainder dark brown; 4-6 dark brown along anterior borders, and narrowly touched with brown along posterior borders at midline; remainder yellow, more pale laterally; 7 with yellow point at midline on anterior border, yellow mesally and laterally; dark brown along anterior border half way to lateral border; touched with brown along posterior border

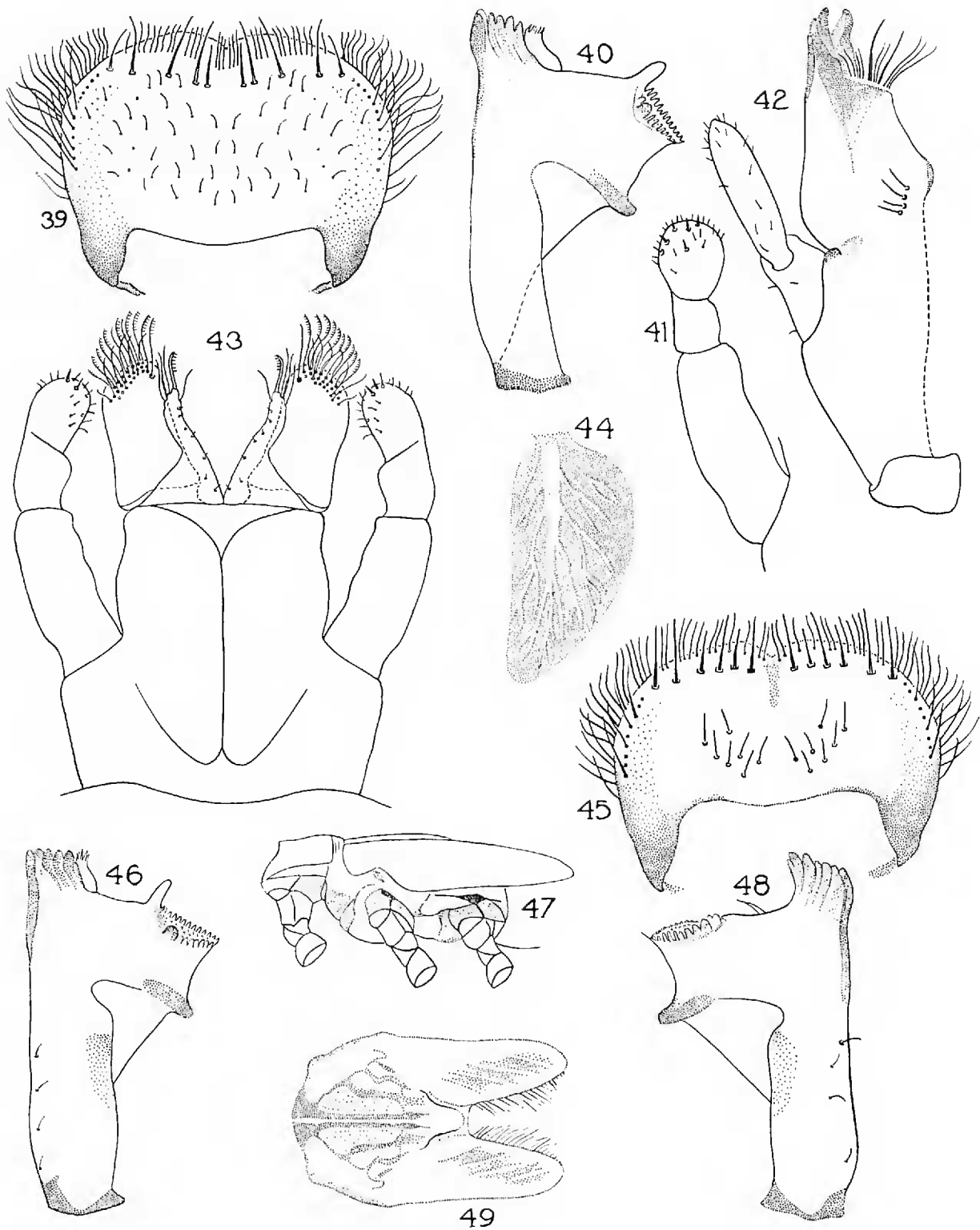


FIG. 39. Labrum of *B. veracusensis*. FIG. 40. Left mandible of *B. veracusensis*. FIG. 41. Labial palpus of *B. veracusensis*. FIG. 42. Maxilla of *B. sancticatarinae*. FIG. 43. Labium of *B. sancticatarinae*. FIG. 44. Gill I of *B. sancticatarinae*. FIG. 45. Labrum of *B. sancticatarinae*. FIG. 46. Left mandible of *B. sancticatarinae*. FIG. 47. Thoracic pleuron of *B. sancticatarinae*. FIG. 48. Right mandible of *B. sancticatarinae*. FIG. 49. Mesonotum of *B. sancticatarinae*.

mesally; 8-9 with yellow triangle along midline, with apex at anterior border; dark brown on either side from anterior to posterior border, brown area extending along anterior border half way to lateral border; yellow laterally and along posterior border; 10 yellow. Intersegmental membranes pale yellow streaked with dark gray along posterior borders. Abdominal gills oval, white. Without coxal gills. Without tubercles. Sternum slightly darker than that of thorax. Cerci yellow, terminal filament more pale.

Holotype male nymph, TENNDIDO RIVER, 3 KM N. EL FORTIN, VERA CRUZ, MEXICO, 1 July 1955, R. B. and J. M. Selander. In Entomological collection University of Utah, Salt Lake City.

DISCUSSION.—*Baetodes bellus* can be distinguished from *B. obesus*, *B. chilloni*, and *B. sp. No. 1* (Mayo, 1968) by the absence of coxal gills. It can be distinguished from *B. solus* by the pale yellow sternum; that of *B. solus* is dark brown.

***Baetodes fortinensis* Mayo, new species**

(Figs. 34-38)

MALE NYMPH.—Length of body 3 mm; cerci longer. *Head* with turbinate eyes rust color, black around bases, very close to midline; pale rim around area of future top in subimago. Lower eyes black. Large ocelli touching eyes; light brown around ocelli and on genae; darker in epicranial fork; pale yellow anterior to small ocellus, narrowly bordered with dark brown between antennae and around bases; deeply notched at bases of antennae; antennae pale brown, darker at tips; intersegmental areas pale. Clypeus pale with black articulations on either side; labrum light brown. Mouthparts as in Figs. 34, 36-38. Labial and maxillary palpi with numerous setae. Each glossa with bladeliike spine at tip; bladeliike spine without pinnae on each paraglossa at medial side of tip; first segment of labial palpus shorter than other two combined. No sclerotization below medial cleft on labrum. *Thorax* with pronotum yellowish brown; anterior border rimmed with dark brown except at midline; reddish brown area on either side midline; yellowish brown laterally; posterior border slightly elevated at midline. Mesonotum yellowish brown with reddish brown pattern; midline pale; anterior border dark brown; reddish brown stripe either side midline terminating about midway to scutellum; dark dot either side midline half way between this stripe and scutellum; wider stripe lateral to this terminating near dot; laterally mottled with reddish brown; wing pads yellowish brown; scutellum pale yellow narrowly bordered with dark brown. Metanotum dark brown, somewhat mottled. Pleural sclerites brown; coxae and trochanters yellowish brown; femora yellow, narrowly bordered with reddish brown at joinings with tibiae; ten to twelve spines along dorsal crests small. Tibiae yellow; tarsi light brown dorsally, darker at joining with claw; small spines on ventral surface of tibiae and tarsi. Claw with six denticles. Sternum pale yellow with dark brown sclerites on furcisternum as in subimago (Fig. 35); sclerites around apodemes at leg bases dark brown. *Abdomen* with terga 1 and 7-8 dark brown, mottled; terga 2-6 and 9 yellowish brown; 10 lighter, more yellow. Without tubercles. Abdominal gills oval, white. Two white, elongated fingerlike gills from each coxa of the long type. Sterna 2-6 and 9-10 yellow, 7-8 brown. Cerci yellow at bases, yellowish brown distally; terminal filament pale yellow.

Holotype mature male nymph, TENNDIDO RIVER, 3 KM N. EL FORTIN, VERA CRUZ, MEXICO, 1 July 1955, R. B. and J. M. Selander. In Entomological collection University of Utah, Salt Lake City.

DISCUSSION.—The mouthparts of *Baetodes fortinensis* differ from those of the others in group without abdominal tubercles. The maxillary and labial palpi of this species have numerous setae (Figs. 34, 38). The first segment of labial palpus is shorter than the other two combined. The spines behind the apical margin of labrum differ. There is no sclerotization below the medial cleft of labrum (Fig. 36).

***Baetodes veracruzensis* Mayo, new species**
(Figs. 39-41)

MALE NYMPH.—Length of body 4 mm; cerci about 5 mm. Head narrowly mottled with light brown between eyes on either side midline; turbinate eyes rimmed medially with brown; brown on either side of epicranial suture, anterior to large ocelli and on genae anterior to compound eyes; yellow around small ocellus; narrowly rimmed with reddish brown between and around antennae; antennae and clypeus pale yellow; labrum light brown bordered with darker brown. Bladelike spine on each glossa pointed. Two long bladelike spines among setae on crowns of maxillae. Labrum very slightly sclerotized below medial cleft. Mouthparts as in Figs. 39-41. Intersegmental membrane between head and pronotum penciled with gray near anterior border of pronotum. *Thorax* with anterior border of pronotum light brown; pronotum yellow mottled with pale brown on either side of midline. Mesonotum reddish brown along anterior border; rest of mesonotum yellow mottled with darker brown than that on pronotum; two pair of brown stripes on either side yellow midline converge anterior to pale scutellum; mottled with brown spots laterally; wing pads yellow. Metanotum yellow; pale brown anteriorly. Pleural sclerites pale yellowish brown. Coxae pale brown, trochanters yellow with brown articulations with femora; femora light brown except pale yellow at joining with trochanters; large elongated yellow spot medially and yellow near tibiae; fringe of white setae on tarsi. Tibiae yellow rimmed with reddish brown at joinings with femora and tarsi. Tarsi yellow, brown dorsally at joinings with claws; six small spines along ventral margin. Claw with seven denticles. Sternum pale yellow. *Abdomen* with tergum 1 dark brown anteriorly and yellow posteriorly; irregular margin of dark brown and yellow between anterior and posterior borders; 1-10 yellow posterolaterally and along pleural fold near attachment of gills; 2-3 brown with yellow medially along posterior borders; 4-6 bordered with brown anteriorly with narrow strip of brown along posterior border on either side midline; 7 like 6 with wider brown area anteriorly; 8-9 with brown triangles based along anterior border and touching at midline; rest of segments yellow; 10 yellow. Dark gray trachea visible laterally near pleural fold on 6-9. Abdominal gills oval, white. One small white fingerlike gill from each coxa, of intermediate type. Sterna 2-9 light yellowish brown, progressively more pale rearward; 10 yellow. Cerci and terminal filament pale yellow.

Holotype male nymph, TENNDIDO RIVER, 3 KM N. EL FORTIN, VERA CRUZ, MEXICO, 1 July 1955, R. B. and J. M. Selander. In Entomological collection University of Utah, Salt Lake City.

DISCUSSION.—*Baetodes veracruzensis* can be separated from all other species without abdominal tubercles by the presence of small coxal gills of the intermediate type. The spines behind apical margin of labrum differ from those of the other species.

***Baetodes sancticatarinae* Mayo, new species**

(Figs. 42–49)

MATURE FEMALE NYMPH.—Length of body 4 mm. Cerci about the same. *Head* with prominent ocelli; large ocelli touching eyes. Reddish brown on either side pale midline and in fork. Pale yellow around small ocellus and elsewhere on head; narrowly rimmed with reddish brown between antennae; antennae pale brown. Mouthparts as in Figs. 42, 43, 45, 46, 48. Two pointed bladeliike spines among setae on crowns of maxillae. Pinnate spine resembling a brush on each glossa. A long simple spine not pinnate on each paraglossa arising below pinnate spines, mesally. *Thorax* with pronotum light brown with large yellow spots; rims of pleural sclerites visible on either side of pronotum. Mesonotum dark reddish brown with amber; pattern as of subimago; reddish brown stripe on either side of pale area along midline terminates in dark elongated dot (Fig. 49). Scutellum very pale yellow; metanotum brown; scattered setae on dorsal surface of thorax. Pleural sclerites amber with dark reddish brown vertical line between anterior margins and coxal articulations. The elongated dark reddish brown streak anterior to pleural sclerite III is typical of all mature specimens (Fig. 47). Coxae and trochanters amber; unsclerotized areas pale yellow; femora yellow except brown at joinings with trochanters and rimmed with reddish brown at joinings with tibiae; washed faintly with light brown in medial third; fringe of white setae on coxae; tibiae yellow; tarsi yellow with reddish brown dorsally at joinings with claws; claw with eight denticles; minute spines along ventral surfaces of tibiae and tarsi. Sternum typical of mature nymph with sclerites as of subimago, sclerites of furcisternum amber in contrast to the narrow dark brown sclerites of basisternum on segment II. Prosternum pale yellow anterior to apodemes; pale brown posterior to these. Meso- and metasternum pale brown mottled with very fine yellow dots giving slightly roughened appearance. Unsclerotized areas around leg bases pale yellow. *Abdomen* without tubercles. Setae on abdomen clustered near midline; many setae encrusted with silt. Terga 1–2 brown, dark brown along anterior borders; 3–8 dark reddish brown along anterior borders, remainder of segments amber; 9 more pale, 10 yellow touched with brown along anterior and posterior borders. Abdominal gills as in Fig. 44; tracheae visible over entire surface; gill I large, others decrease in size rearward; white. One fingerlike gill from each coxa of the long type. Sternum I pale brown mottled with very fine yellow dots; 2–6 light brown; 7–9 with brown areas decreasing in size rearward with yellow anteriorly and posteriorly. Cerci amber; with minute reddish brown spines on segments in basal third; terminal filament yellow.

MATURE MALE NYMPH.—Length of body 3 mm. Cuticula of head and thorax split along midline showing subimago with fairly wide pale yellow strip along midline, pale scutellum narrowly rimmed with reddish brown. On either side of midline is

a reddish brown strip terminating in two prominent reddish brown elongated dots anterior to scutellum with narrow white line separating brown strip laterally from rest of brown scutum. Terga brown, except 4–6 amber medially; 7–8 dark brown, 9 more pale, 10 yellow touched with brown along anterior and posterior margins as in female. Cerci amber with brown spines as on mature female; terminal filament yellow.

Holotype female nymph, RIVER PIRABEIRABA, 26° 15' B. 48° 54' L. 10 M, SANTA CATARINA STATE, BRAZIL, November 1965, F. Plaumann. In Entomological collection University of Utah, Salt Lake City. Five paratypes same data, same deposition as holotype.

DISCUSSION.—The pattern of spines behind apical margin of labrum differs from all others in the group without abdominal tubercles. More trachea show on gills than on gills of all other species. Spines on basal third of cerci on mature specimens are unique.

Immature specimens: don't have spines on cerci (these occur only on mature specimens); none of their terminal filaments have spines; their thoracic sterna and abdominal sternum 1 are pale yellow; 2–5 pale brown, remainder increasingly more yellow rearward; they have a brown streak laterally on 6–10; their cerci are pale yellow basally, light brown distally; with the terminal filament yellow.

ACKNOWLEDGMENTS

The writer wishes to acknowledge the kindness of Dr. George F. Edmunds Jr., chairman of the Department of Environmental Biology, University of Utah for the loan of his collection of *Baetodes*. She is also indebted to Dr. Jay R. Traver, emeritus professor of Zoology, University of Massachusetts, for her help in going over the manuscript.

LITERATURE CITED

- COHEN, S. D. AND R. K. ALLEN. 1972. New species of *Baetodes* from Mexico and Central America (Ephemeroptera: Baetidae). *Pan-Pac. Entomol.*, 48: 123–135.
- EDMUNDS, G. F., JR. 1950. New records of the mayfly *Baetodes*, with notes on the genus. *Entomol. News*, 61: 203–205.
- MACAN, T. T. 1961. A key to the nymphs of the British species of Ephemeroptera. *Freshwater Biol. Assoc., Sci. Publ.* 20: 1–63, 37 fig.
- MAYO, V. K. 1968. Two new species of the genus *Baetodes* from Ecuador. *Pan-Pac. Entomol.* 44: 251–257.
- NEEDHAM, J. G. AND H. MURPHY. 1924. Neotropical mayflies. *Bull. Lloyd Library*, 24, *Entomol. Ser.*, 4: 55–56.
- TRAVER, J. R. 1943. New Venezuelan mayflies. *Entomol. Venezolena*, 2(2): 79–98.
1944. Notes on Brazilian mayflies *Bol. Mus. Nac. Rio de Janeiro Zool.*, 22–20.
- TRAVER, J. R. AND G. F. EDMUNDS, JR. 1968. A revision of the *Baetidae* with spatulate-clawed nymphs. *Pac. Insects*, 10: 629–677.